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NAVIGATION AND NAUTICAL ASTRONOMY.

(1) *Air Navigation. Notes and Examples.* By Instructor Capt. S. F. Card. Pp. vi+140. (London: Edward Arnold, 1919.) Price 10*s.* 6*d.* net.

(2) *Navigation.* By Prof. Harold Jacoby. Second edition. With a chapter on Compass Adjusting and a Collection of Miscellaneous Examples. Pp. xi+350. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1918.) Price 11*s.* 6*d.* net.

(1) THE author of this much-needed little book may be regarded as something of a pioneer, for, despite the general interest taken in the subject, this would appear to be the first work formally devoted to the navigation of the air. When, some years since, schools of navigation were established at various centres of aviation, Capt. Card was associated with Brig.-Gen. Briggs, R.A.F., in framing a general plan for the education of pilots and observers. This fact alone is a sufficient proof of the competence of the author for the work he has taken in hand.

Nautical readers will be interested to see how closely the navigation of the air is related to the coastal navigation with which they are familiar. We have the same problems, but on a greatly magnified scale. Thus in fixing a position by cross-bearings, it is not a matter of a couple of headlands three or four miles apart, but Reading and Oxford, or Bedford and Cambridge, are proposed as pairs of bearings suitable for the exercise of the student.

As stated in the preface, the subject is treated in a very elementary manner, making little demand upon the mathematical knowledge of the student. The explanations are clear and simple, with an abundance of well-executed diagrams. An excellent notion adopted is to add at the end of each chapter a blank page for the reception of any notes the student may wish to make upon the contents of the chapter.

Upon the subject of the navigation of the air Major-Gen. Seely, Under-Secretary for Air, made an important statement in the House of Commons on June 26. He said that the whole system of instruction is being revised, and the schools reorganised, and that endeavours are being made to perfect, so far as possible, mechanical aids, such as the sextant. He added that there is great hope that a satisfactory form of artificial horizon for air use will be brought out, and experiments are in actual progress. Gen. Seely's remarks appear to refer chiefly to that form of navigation over the open ocean with respect to which there is at present much uncertainty and obscurity. Capt. Card's manual, on the other hand, is limited to the type of navigation over the land corresponding with what is known as "pilotage" in ordinary marine navigation, in which position is generally determined by sextant angles and bearings of known objects. Let us hope, when more data are available, that the author may supplement his very clear exposition of this type by a more general treatise, embracing also ocean air navigation, in which position has to be determined by observations of the heavenly bodies. Some knowledge has been gained from the experiences of Grieve and Brown, but much remains to be learnt in these matters.

(2) Prof. Jacoby in his book is somewhat hampered by self-imposed limitations. Navigation and nautical astronomy, being mathematical sciences, can scarcely be completely treated upon a non-mathematical basis, whereas in this instance we have it explicitly stated in the preface that "the author has not assumed that the reader possesses formal mathematical and astronomical knowledge, or desires to possess such knowledge."

Nevertheless, upon the lines so laid down we have a very readable book, calculated to be of interest not only to those unconnected with the sea who would acquire some insight into the processes of navigation, presented in a chatty, discursive, or, as the author himself puts it, "informal," manner, but also to the professional navigator, who, having already some acquaintance with the matters dealt with, may like to see the various problems treated in a somewhat different fashion from that to which he is accustomed. In a little work of 350 pages, about one-half of which is devoted to tabular matter, we have an account of the leading modern methods employed in position finding at sea, while the various tables, though in somewhat abridged form, suffice for the calculations of actual navigation in ordinary circumstances. Amongst these the Davis table of combined natural and logarithmic haversines, which so greatly simplifies the calculations for the Marcq position lines, is conspicuous. Another useful feature is Table ii., an azimuth table, but with regard to this a word of caution might perhaps be added that, based as it is on the formula,

$$\frac{\text{sine azimuth}}{\text{sine hour angle}} = \frac{\text{sine polar distance}}{\text{sine zenith distance}}$$

the slow rate of change in the sine about 90° takes us into troubled waters in the neighbourhood of the prime vertical, where some other method for azimuth might be employed with advantage.

One other observation may be offered, with regard to a statement on p. 99 that "the moon is now so rarely observed that we have not given examples of lunar observations." It is quite true that tables of distances are no longer published, and that the method of finding longitude by measuring lunar distances has in consequence become obsolete. But for position line work an altitude of the moon in the daylight, with a simultaneous observation of the sun, often enables the navigator to obtain a complete "fix" at one and the same time, an advantage unattainable by any other method in the daytime. Probably more alti-

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tudes of the moon are observed at sea to-day than at any time previously.

There is one class of reader to whom the work of Prof. Jacoby should especially commend itself, and that is the fortunate owner of the palatial steam yacht who would fain make himself acquainted with what it is that his sailing master is about. It was perhaps in the interest of this type of reader that a final chapter is devoted to a circumstantial account of the voyage of the hypothetical steam yacht *Nav* from New York to Colon on December 18, 1917. Moreover, the story is very well told. H. B. G.

BEVERAGES.

Beverages and their Adulteration. Origin, Composition, Manufacture, Natural, Artificial, Fermented, Distilled, Alkaloidal, and Fruit Juices. By Dr. Harvey W. Wiley. Pp. xv+421+11 plates. (London: J. and A. Churchill, 1919.) Price 21*s.* net.

DR. WILEY remarks that his book "is not written for the scientific investigator, but for the average, sober-minded, reasonably well-educated American citizen." A general account of the beverages discussed is, in fact, what is given, neither severely technical nor flimsily "popular." The facts are stated carefully, as would be expected from the author, but little or no scientific knowledge on the part of the reader is assumed.

Water, as the beverage *par excellence,* is given pride of place. Both ordinary drinking supplies and mineral waters are dealt with, and the information given is such as will enable the reader to obtain an intelligent idea of water supply in its bearing upon the public health and upon manufacturing operations. Various processes of water purification are briefly described, and the utility of chemical and bacteriological analyses of water is explained. Touching on the widespread faith of ordinary humanity in the virtues of medicinal springs, the author dryly remarks that this faith is "not so well founded in fact as it is extensive in belief." At the same time, he indicates the factors producing the undoubted benefits which often result from "taking the waters"—namely, the change of habits, the simpler diet, avoidance of excesses, and so on. These, of course, are active aids in restoring health even when the water itself has no particular therapeutic value, except, perhaps, as a laxative.

Apropos of the habit of drinking ice-cold beverages—a habit more common on the other side of the Atlantic than here—the evil effects are summed up in an amusing quotation:—

Full many a man, both young and old,
Has gone to his sarcophagus
By pouring water, icy cold,
A-down his hot œsophagus.

"Soft drinks" have an especial interest for Americans just now, and perhaps they may presently acquire an added importance for ourselves. The term is applied in the United States to "non-alcoholic" beverages. Whilst the typical "soft drink" is soda-water mixed with a flavoured syrup, other "soft" beverages are legion. Apart from the undesirability of much sugar in drinks consumed largely by children, and the above-mentioned habit of taking them ice-cold in hot weather, Dr. Wiley does not see much objection to the general run of non-alcoholic beverages when these are prepared in a hygienic manner from wholesome materials. Some, however, contain drugs such as caffeine or cocaine; these are highly objectionable, and should, the author considers, be prohibited by law.

In the sections devoted to tea, coffee, and cocoa the reader will find some notes and historical sketches that are worth perusing, apart from the main descriptions of these beverages.

An interesting section is the one dealing with wine. Dr. Wiley has personally inspected nearly all the French vineyards where the most famous wines are produced, and has also visited the Spanish, German, and other wine-growing areas in Europe. His pages will be welcomed as giving a present-day account of the industry. He remarks, by the way, that the mean annual wine-production of the Château Y'quem is only 90 tuns, and opines that there is something miraculous in this quantity supplying the large amount of Château Y'quem wine, so-called, that is drunk in the world.

Some sensible advice is offered on the production of uniform and distinctive types of wine in the United States, and on the adoption of distinctive native names for them, instead of calling them by foreign names which are not really applicable.

Whilst here and there one misses the facile touch of the purely literary man, Dr. Wiley's occasional notes and historical extracts serve agreeably to enliven the substantial body of facts which he has brought together. The book is, of course, written from the American point of view, but much of the matter is of quite general interest, and will appeal to readers on both sides of the Atlantic. C. SIMMONDS.

OUR BOOKSHELF.

Les Symbiotes. By Prof. Paul Portier. Pp. xx+315. (Paris: Masson et Cie, 1918.) Price 5 francs.

THIS book, dedicated to his Serene Highness the Prince of Monaco, contains a lively exposition of a heresy, in regard to which the author frankly admits that if some years ago he had seen it stated at the beginning of an essay, he would probably have read no more. The heresy is that apart from bacteria, all organisms are double being formed by the association and "emboîtement" of two different kinds of creature. There are partners within every cell, partner-bacteria, which the author calls "symbiotes." A symbiote is a domesticated micro-organism with two remarkable properties, an extreme plasticity that

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